Prepress Terms

Blueline

A diazo (UV-exposed and self-processed) photo print made to proof pagination, image position, and type. Bluelines have been made mostly obsolete by the digital revolution.

Camera-ready

Said of text or artwork ready to be photographed by a process camera.

DPI

An abbreviation for *dots per inch.* Refers to the resolution at which a device, such as a monitor or printer, can display text and graphics.

Continuous-tone art and line art

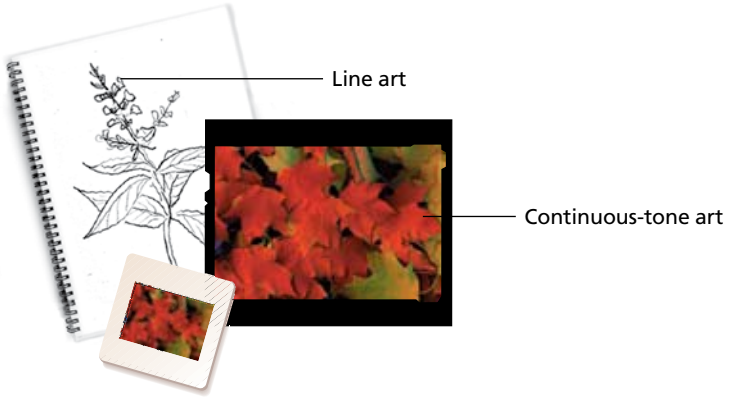
Continuous-tone art is art, such as photographs, that consists of shades of gray and color gradations. It's distinguished from line art, such as a line drawing, which has no tonal variation. If you look closely at continuous-tone art, you can see that shades of gray or color blend smoothly without breaking into dots or other patterns. When the art is printed, the corresponding regions are reproduced as arrays of different-sized dots printed in the colors used on the press.

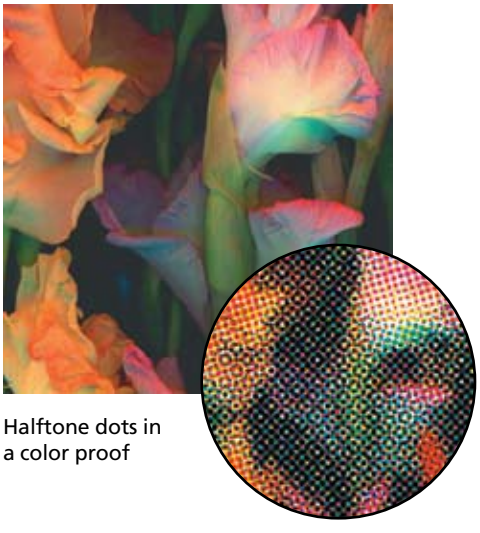
Dot gain

Many variables—from ink to paper surface and press used—affect the size of halftone dots. A certain amount of *dot gain*, or increase in halftone dot size, occurs naturally when wet ink spreads as it's absorbed by the paper. If too much dot gain occurs, images and colors print darker than specified.

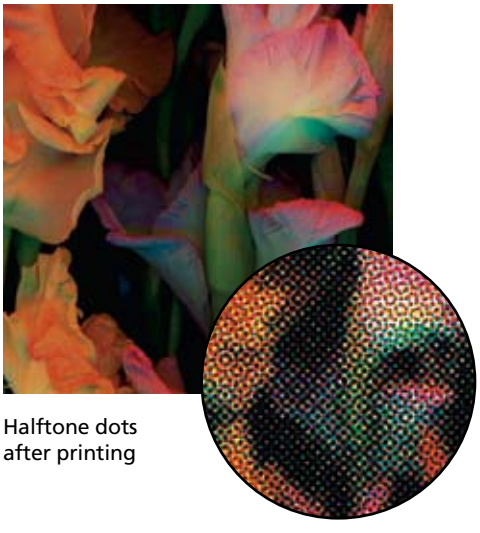
Dot gain is one of the characteristics taken into account when color-management systems are applied.

(See page 110 for more information on dot gain.)





Halftone dots in
a color proof



Halftone dots
after printing

Halftone screens

Ink is an all-or-nothing medium in the sense that any spot on the paper is either inked full-strength or not at all. To simulate shades of gray or color on a commercial press, the image must be broken into arrays of dots of various sizes using *halftone screening*.

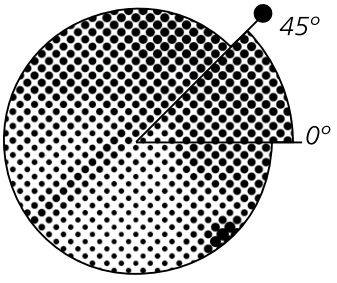
In the case of black-and-white photography, black dots are used to simulate shades of gray. Areas where the dots are small appear light gray, and areas where the dots are large appear dark gray or black. The human eye is tricked into seeing tonality by its ability to average the tiny printed dots into the background paper. You "see" gray when you're really looking at small printed black dots on a field of white paper.

To achieve a satisfactory range of color, the printing press superimposes four arrays of dots—in cyan, magenta, yellow, and black ink. A region with larger dots appears darker than a region with smaller dots. The positioning, or *register,* of the four arrays on top of each other is critical to quality printing.

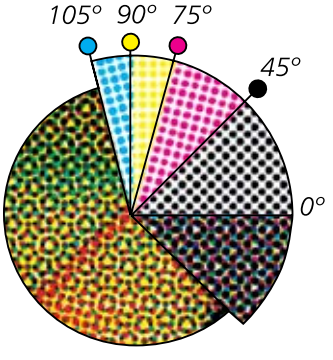
Any visible pattern of interference between the four arrays is distracting. To minimize the chance of interference, each array is oriented at a different angle on the press.

Image resolution (ppi)

Image resolution is the number of pixels displayed per unit of length in an image, usually measured in *pixels per inch.* An image with a high resolution contains more, and therefore smaller, pixels than an image of the same dimensions with a low resolution. For best results, use an image resolution that is greater than the printer's resolution (a factor of 2x is appropriate).



Halftone screen with black ink



Halftone screens with process inks at different screen angles; correctly registered halftone dots form rosette patterns.

Knocking out and overprinting

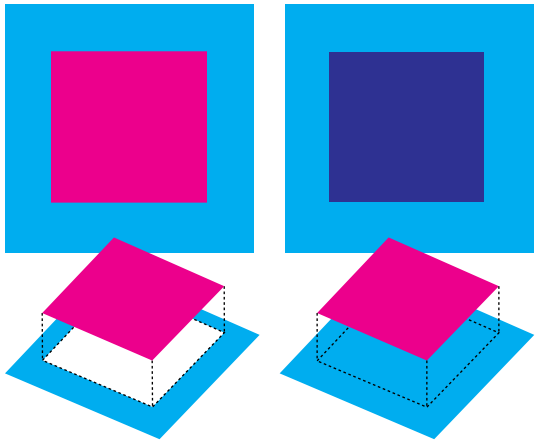
When artwork involves two objects or colored regions that overlap each other, a designer can choose either to let the top object eliminate, or *knock out,* what is beneath it or to allow *overprinting.*

In most cases, you want an object to knock out the one below it, to avoid unintended color blends. However, you can use overprinting to create special effects or to hide errors in press register (see "Trapping" on page 24).

Adobe Illustrator and InDesign both feature an Overprint Preview menu selection that can help you see the effect of overprinting colors.

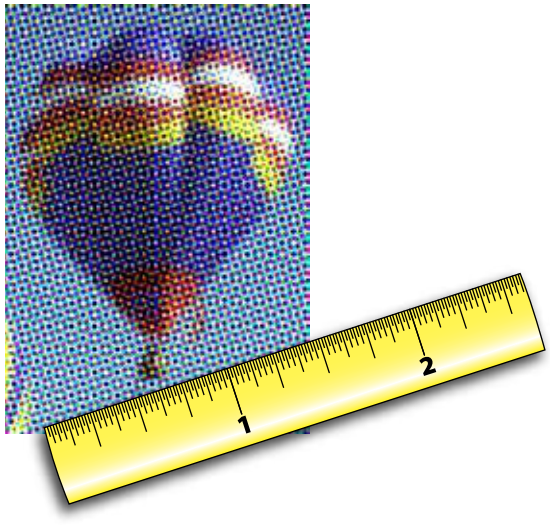
Line screen (lpi)

Line screen, also called *screen ruling* or *screen frequency*, is the number of halftone dots per linear inch used to print grayscale or color images. Line screen is measured in lines per inch (lpi)—or lines of cells per inch in a halftone screen. It gets its name from acid-etched lines on glass screens that were originally used in graphic arts cameras to divide an image into microscopic *circles of confusion*—which, by varying exposure, create halftone dots. The electronic evolution of the halftone uses a *virtual screen* to create its halftone dots.



Knockout

Overprint



Machine resolution

Output devices like film imagesetters and platesetters have extraordinarily high resolution. Their minimum imageable mark is called a *device pixel* (sometimes called a *machine spot*). A 300-dpi laser printer uses a 1/300" square device pixel; a 600-dpi printer uses a 1/600" square device pixel. Film imagesetters, which are capable of much higher resolutions, can make a mark as small as a 1/3600" square dot. Modern platesetters have resolutions as great as 1/5000". By comparison, most computer displays work with device pixels that are 1/72" square—quite coarse, compared to printing processes.

Misregister

Paper sometimes stretches and shifts as it absorbs moisture and is pulled through a press. Printing plates can also be mounted out of alignment. These factors can cause multicolor jobs to print out of register, resulting in slight gaps or hue shifts between adjacent colors. Trapping and overprinting can conceal some of these flaws. Misregister can also cause images to appear blurred or out of focus. If a press has printed out of register enough to cause images to appear unsightly, the press run should be made again with colors in register.

Moiré patterns

When process-color separations are printed, the arrays of dots for each color are oriented at different angles to minimize interference patterns. The screens are positioned so that the dots form a symmetrical pattern called a *rosette,* which the human eye merges into continuous-tone color.

The relationship between the screen angles is critical. Occasionally, a pattern in a photo (woven furniture and herringbone fabrics are common culprits) interferes with one or more screen angles, causing a noticeable pattern of interference lines called a *moiré pattern.* These patterns are also caused by attempting to print photos that have been scanned from already-printed material. Moiré patterns from printed sheets can be removed by some scanner software and also by techniques in Adobe Photoshop. It isn't advisable to scan printed material, because the result will almost certainly produce a moiré pattern.

When moiré patterns show up in normal printing processes, it can be an indication of a problem in the prepress or platesetting software.

In register

Out of register

PDF (Portable Document Format)

PDF is a document format developed by Adobe for handling documents in a device- and platform-independent manner. It allows files to be viewed, transmitted, printed, and archived in a single format. The PDF format works on all major operating systems, including Mac OS, Windows, and Unix. Adobe Acrobat software provides for the conversion of documents into PDF and allows documents to be created from any application on any computer platform. When converted into PDF, documents can retain a full range of color, graphics, and high-quality typography. Reduced-resolution PDF files make it possible to transfer them efficiently over the Internet for copy checking and on-screen proofing.

Process colors

In the four-color printing process, color is reproduced using transparent pigments of cyan, magenta, and yellow (CMY). These are called *process colors.* In theory, process colors create shades of gray when combined in equal combination and black when combined at full strength. Because of impurities in the inks, however, equal amounts of the three don't produce neutral gray, and full-strength inks combine to create a muddy brown. To achieve contrast and detail in shadows, and to assist in maintaining neutral grays, black ink (also transparent, and identified by the letter K) is added to the three process colors.

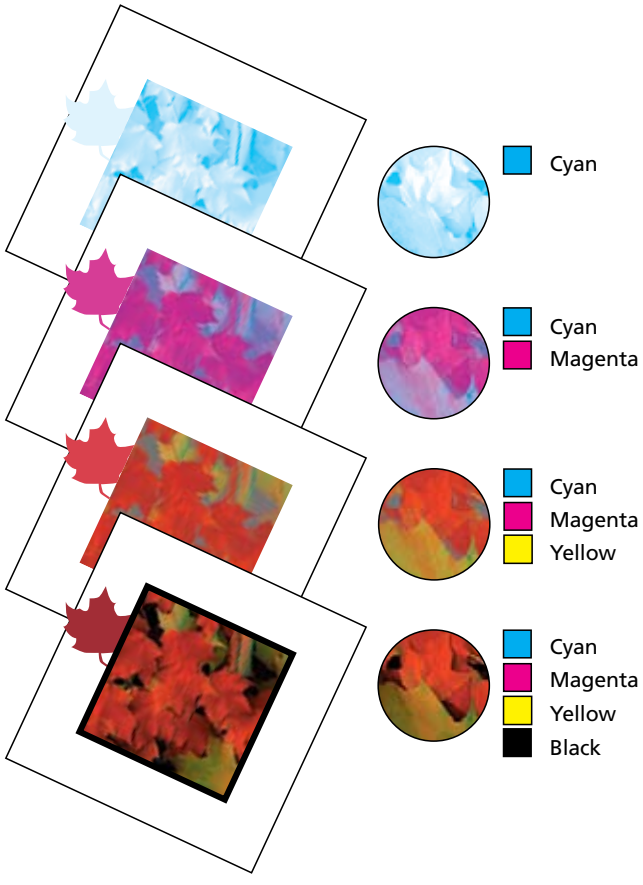
Using black ink to replace neutral combinations of C, M, and Y is also economical for printing and helps to maintain the neutrality of midtones.

PostScript

The PostScript language is a page description language developed by Adobe as a way to describe to a printer the image on a page. The introduction of PostScript printers created the electronic publishing revolution. PostScript has become the standard way for a computer to communicate with a printer, imagesetter, or platesetter.

RIP (Raster Image Processor)

The RIP interprets the PostScript code sent from a computer application and then translates that code into instructions for the marking engine that marks the pixels on the paper, film, or plate. A RIP is built into all PostScript desktop printers and is a separate component for imagesetters and platesetters. Some RIPs are software based.


Cyan
Cyan
Magenta
Cyan
Magenta
Yellow
Cyan
Magenta
Yellow
Black

Separations

To print color artwork and images on a commercial press, each page is separated into component images called *color separations*. Traditionally, separations were created photographically through colored filters, with the results exposed onto large sheets of film. Today, separations are created digitally. There are usually four separations per page, one for each of the CMYK process colors and one for each spot color being used.

Within each separation, photographs are screened into an array of halftone dots (or similar patterns). Type, line-art illustrations, and similar graphics are either printed as solids of colors or screened into halftone patterns according to the assigned values in the originating document.

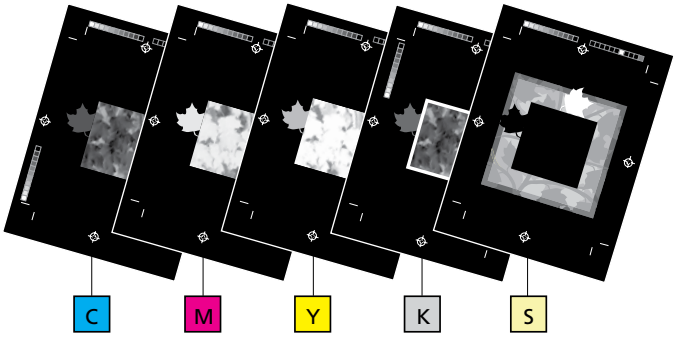
Designers generally don't produce separations; instead, they provide complete digital files to the printer for production. In modern printing, the separation of colors in a printed document is done as part of platesetting.

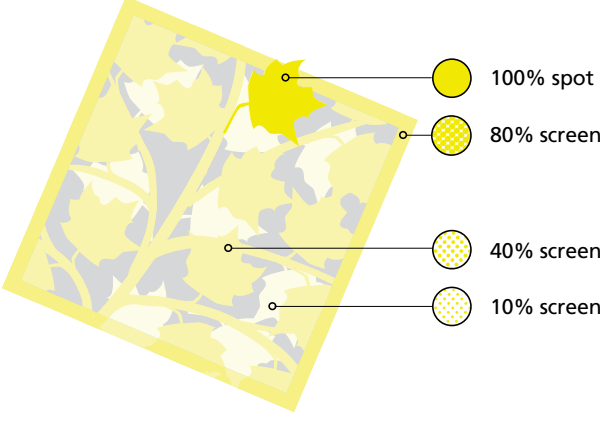
Spot colors and tints

Spot color refers to color printed using inks *other* than process colors. Each spot color is produced using a single ink and printing plate. You can choose from among hundreds of different spot-color inks.

Spot color may be used to reproduce colors not within the CMYK gamut. A spot color may also be used to *bump*, or boost, the density of a process color. Spot color is often used to save money when only one or two colors are needed—a job can then be printed on a less-expensive two-color printing press. (See page 54 for guidelines on choosing spot colors.)

A spot color printed at 100 percent density is a solid color and has no dot pattern. A *tint* is a lightened spot or process color created by printing that ink with halftone dots. This process is typically referred to as *screening*.


C
M
Y
K
S


100% spot
80% screen
40% screen
10% screen

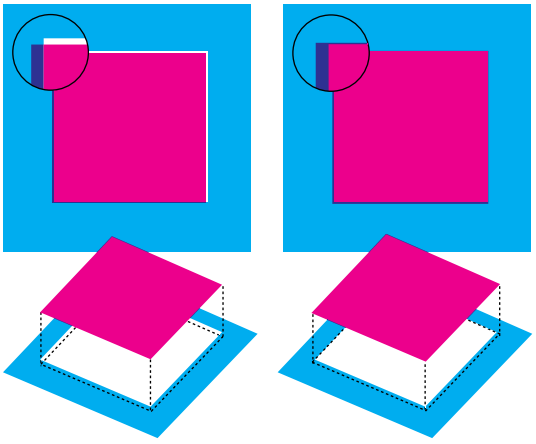
Trapping

The quality of a printer's work depends on getting the different inks to print *in register*—that is, exactly aligned with each other. If one or more inks print out of register, white gaps may appear between adjacent objects where the paper shows through, and there may be fringes of unexpected color. To minimize the effects of misregister, commercial printers use a technique called *color trapping*: adjacent colors are *intentionally* set to overprint along common boundaries. Trapping can be done manually in an illustration or an image-editing program, but today much of it is done by sophisticated processes in prepress production software.

Undercolor removal (UCR) and gray-component replacement (GCR)

At any point on the page where the three CMY inks are used at combined percentages to produce gray, the combination can be replaced by black. To avoid having too much ink on the page (which can cause drying problems), printers use techniques called *undercolor removal* (UCR) and *gray-component replacement* (GCR). With UCR, cyan, magenta, and yellow colors are reduced slightly to put the right amount of ink on the page and thereby allow the ink to dry. With GCR, black ink replaces much of the cyan, magenta, and yellow in neutral gray areas according to a complex formula.

Printing with GCR separations allows neutral colors to be printed with better color consistency. This is particularly beneficial on high-speed web-fed printing presses and for screen printing, where maintaining gray balance can be challenging. Sheet-fed printing is more commonly done with UCR separations, because the presses run more slowly and neutral balance is easier to control.



Misregister with no trap Misregister with trap